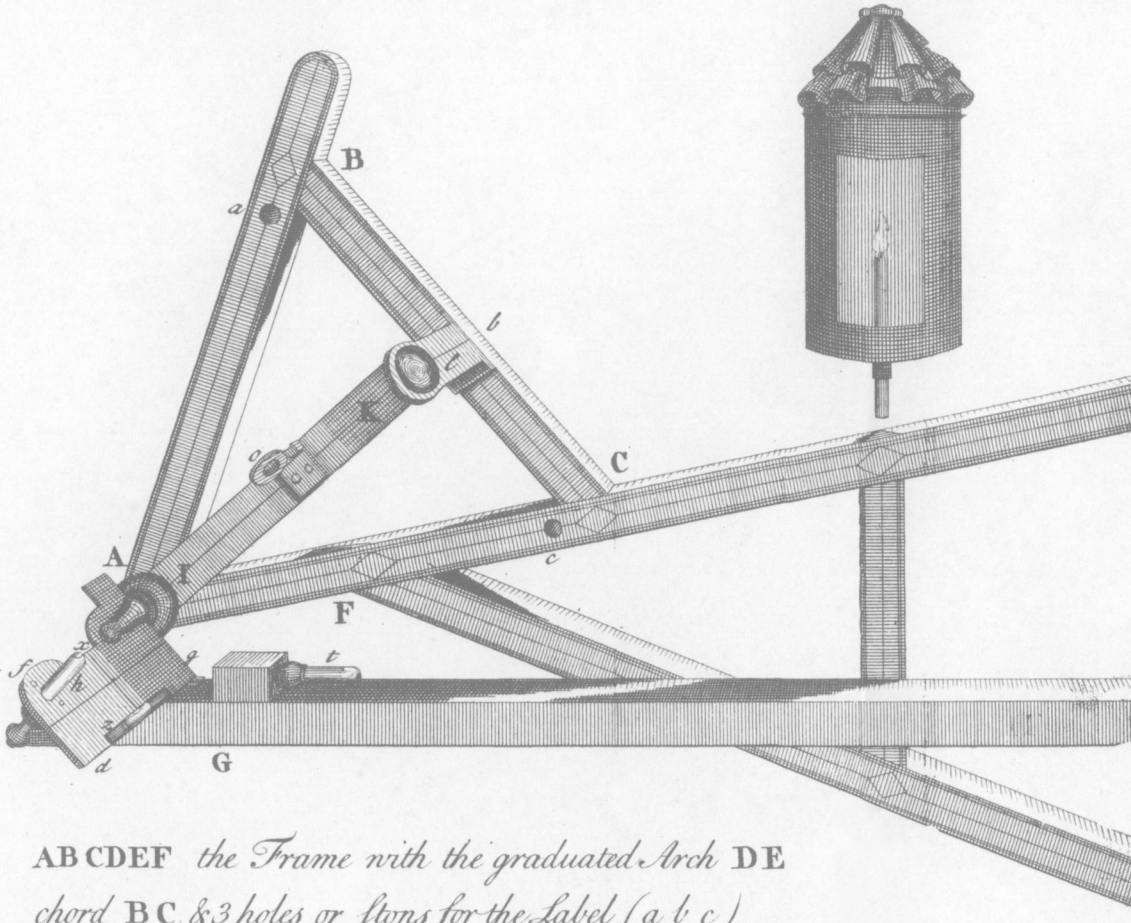
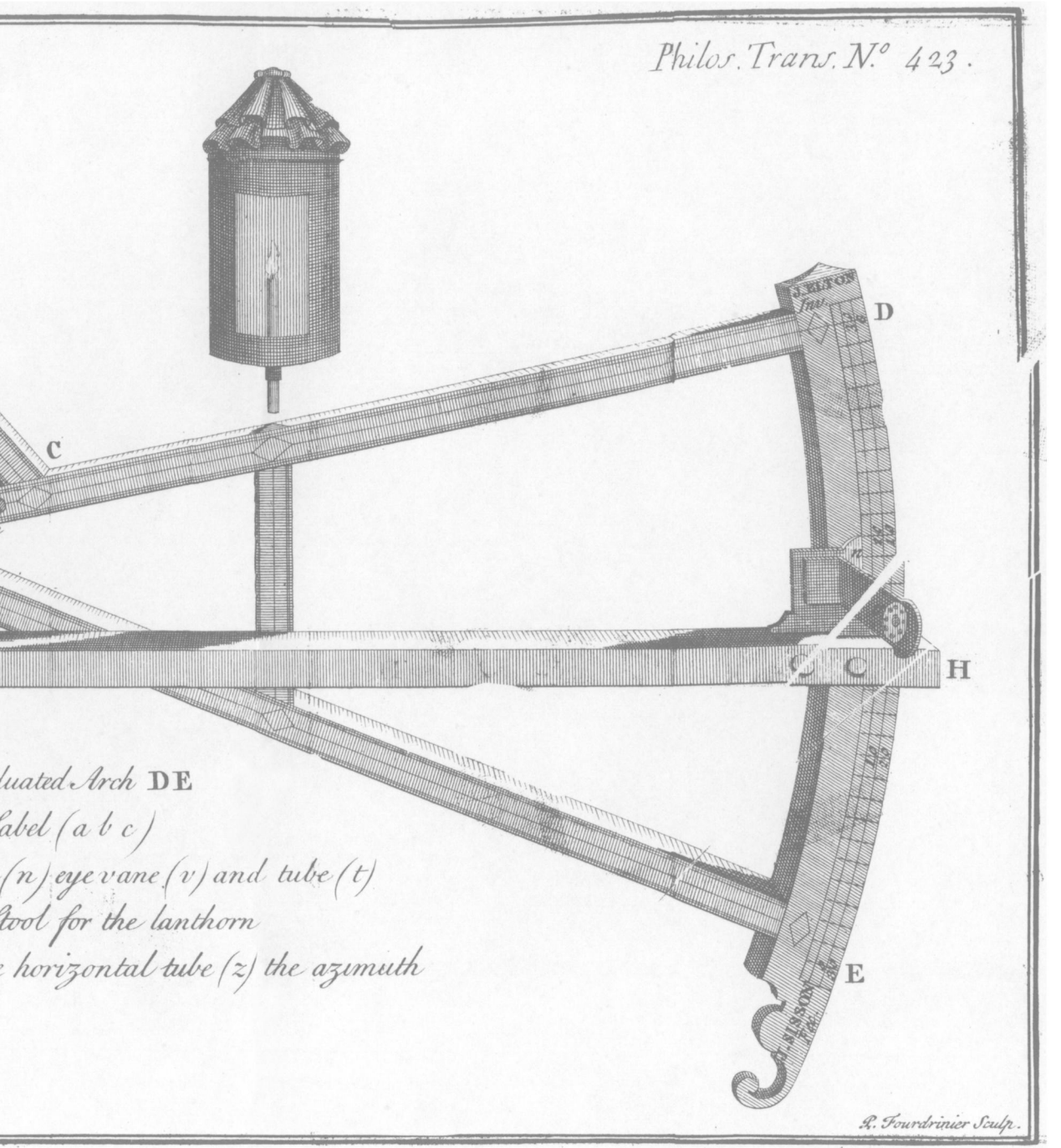


AB CDEF *the Frame with the graduated Arch* **DE**
chord **B C** *& 3 holes or stops for the Label (a b c)*
GH *the Index with a Nonius plate (n) eye vane (v) and tube (t)*
IK *the Label (l) the lens (o) the stool for the lanthorn*
d f g. the shield or ray plate (h) the horizontal tube (z) the azimuth tube and (x) the axis.

R. Walter delin.t


Philos. Trans. N.° 423.
D
C
H
E
luated Arch DE
abel (a b c)
(n) eye vane (v) and tube (t)
tool for the lanthorn
horizontal tube (z) the azimuth
R. Fourdrinier Sculp.

The Obſervations Mr. Robie *made on the* Solar Eclipſe, Nov. 27, 1722, *were as follows:*

H.	′	″	
7	27	00	He ſaw the Sun riſe eclipſed about four Digits on his ſupreme Vertex; to the S W the greateſt Part of the Shade lay.
			Then we could obſerve no more 'till
8	30	00	The Sun began to appear, and ſix Digits, or thereabouts, were eclipſed.
8	55	15	The Sun was eclipſed 4 ¾ neareſt; and then the Sun's Diameter was to the Moon's, as 1000 to 972.
9	00	15	Were hid 4½ nearly; and the Sun's Diameter was to the Moon's as 1000 to 975.
9	19	45	A little Spot on the Sun emerged.
9	25	45	I ſaw the Moon go off the Sun, and Mr. *Danforth* at the ſame Time: And Mr. *Appleton* at
9	25	20	

II. *The Deſcription of a new* Quadrant *for taking* Altitudes *without an Horizon, either at Sea or Land. Invented by Mr.* John Elton.

THIS Inſtrument contains four principal Parts, *viz.* a Frame, an Index, a Label, and a Shield; and theſe conſiſt of ſeveral Parts. (*Vid. Tab.*)

The

The Frame has two Parts, one a graduated Arch of 30 Degrees, each Degree being ſubdivided into ſix equal Parts; the other a Chord of an Arch of 60°, divided into two equal Parts (at the Extremities and in the Middle of which are Holes or Stops for the Label) together making 90° or a Quadrant.

The Index turns upon the Center of the Frame the whole Compaſs of the Arch, and has three Parts; *viz.* a *Nonius* Plate, an Eye-Vane, and a Tube. The *Nonius* Plate moves with the Index, and ſubdivides each of the ſmall Diviſions of the Arch into ten equal Parts or Minutes. The Eye-Vane is to look through in forward Obſervations. The Tube is to ſhew, when the Index is horizontal.

The Label moves upon the Center of the Frame the whole Compaſs of the Chord of the Arch of 60°, having three fixed Stations thereon, at 30°, 60°, and 90°, and contains two principal Parts; *viz.* a Lens, and a Lanthorn. The Lens is to form the Sun's Image upon the Shield. The Lanthorn is neceſſary in Nocturnal Obſervations.

The Shield is fixed in the Center of the Frame, and has three Parts; *viz.* an Azimuth Tube, a Horizontal Tube, and an Axis, or in Backward Obſervations a Ray-Plate. The Hole in the Shield is to receive the Sun's Image. The Azimuth Tube is to direct the Plane of the Inſtrument perpendicular. The Horizontal Tube is to ſhew when the Label is level. The Axis is to cut the Object in forward Obſervations.

Rule

Rule for either backward or forward Obſervations.

If the Altitude does not exceed 30°, the Label muſt be placed at the Station on the Radius or longeſt Limb of the Quadrant; if the Altitude is between 30° and 60°, at the middle Station; and if the Altitude exceed 60° at the uppermoſt Station.

To take the Sun's Altitude by a backward Obſervation.

This is done without uſing the Sight-Vane or Horizontal Tube on the Shield. Hold the Quadrant with both Hands in ſuch a manner as is apteſt for keeping it ſteady, the Back of the Arch being turned toward the Sun. When the Bubble of the Azimuth Tube is brought under the Hole in the Shield, cauſe the Sun's Image to fall on the Hole in the Shield, ſo that it may reſt in the Center of the Sun's Image; the Inſtant the Azimuth Tube and Sun's Image are thus regulated, ſee if the Bubble in the Horizontal Tube on the Index (which 'till then is diſregarded) leaves the open End of the Tube, or ſtops any where clear of the Ends of the Tube: If theſe happen at the ſame Juncture, the Altitude is then truly taken; but if the Bubble had remained in the encloſed End of the Tube, when the Azimuth Bubble and Sun's Image were regulated, the Index muſt have been ſlid up; and if tarried in the open End, moved down, until the Horizontal Bubble on the Index quit the open End of the Tube, or ſtop between the Ends, as was before obſerved; and then is the Quadrant ſet. In continuing the Obſervation for a Meridian Altitude, the Quadrant being

being ſet, as the Sun riſes, the Horizontal Bubble on the Index will not quit the open End of the Tube, or ſtop between the Ends, but hang there, or leave it after the Azimuth Bubble and Sun's Image have been regulated, which will require the Index to be continually moved down in order to keep the Quadrant ſet. When the Sun is up, or on the Meridian, the Quadrant will remain ſet for ſome time; and on the Sun's falling, the Horizontal Bubble will have a reverſe Tendency inclining or running wholly to the encloſed End of the Tube.

To take the Altitude of the Sun or Stars by a forward Obſervation.

In this Method, the Lens and Tube on the Index are diſregarded. Hold the Quadrant vertical, and looking through the Eye-Vane, direct the Axis or upper Edge of the Shield to the Sun or Star; if the Axis cut the Sun or Star at the ſame Inſtant that the Bubble in the Horizontal Tube on the Shield quit the open End, the Altitude is then truly taken, and the Quadrant ſet. But if it ſhould leave the open End of the Tube before the Axis or upper Edge of the Shield cut the Sun or Star, then the Eye-Vane (or which is the ſame, the Index) muſt be ſlid down; and if it remain at the open End, or quit it whe nthe Axis is above the Sun or Star, moved up until the Quadrant is ſet. In continuing the Obſervation for a Meridian Altitude, as the Sun or Star riſes, the Bubble in the Horizontal Tube will always quit the open End of the Tube before the Axis cut the Object; ſo that to keep the Quadrant ſet, the Eye-Vane muſt on every ſuch Alteration be conſtantly moved down; while the Sun

Sun or Star is on the Meridian, the Quadrant will remain ſet; and when the Sun or Star falls, the Bubble will act contrary to what it did in the riſing, reſting wholly in the open End of the Tube.

To take the Sun's Altitude with the Horizon.

Turn the Back of the Arch towards the Sun, and cauſe the Sun's Image to fall on the Hole in the Shield, at the ſame time looking through the Eye-Vane, cut the Horizon with the Axis.

N. B. In taking the Altitude of the Stars, a ſmall Light muſt be fixed in the Lanthorn; the leſs the better. It will be beſt in forward Obſervations of the Sun, to take the Altitude of the upper Limb, allowing for the Semidiameter; and when the Sun is very clear, take his Altitude by a backward Obſervation, the forward Method being chiefly intended for Nocturnal Obſervations, and when the Sun is too much obſcured to give any Shade or Image.

There was at the ſame time laid before the *Society*, "An Extract made by Mr. *Elton* of Obſervations of "the Latitude from the Journal of Capt. *Walter* "*Hoxton*, Commander of the Ship *Baltimore* from "the River of *Thames* to *Maryland* on the Conti- "nent of *America*, by *Davis*'s (or the common) "Quadrant with the Horizon, and by Mr. *Elton*'s "(a new invented Quadrant) without the Horizon, "*Anno Dom.* 1730."

From this Extract it is obſervable, that in moderate Weather the Difference of the Obſervations, made

by the two Sorts of Quadrants, was commonly no more than 1′; with ſtrong Gales and a large Sea 5′; in fair Weather; in hard Squalls; the Sea running high, 6′; in eaſy Gales 9′; in fair Weather and a large Swell 16′; once in ſmooth Water 16′; and the greateſt Difference of all was, with freſh Gales, 21′: And this Difference was conſtantly found to give the Latitude more Northerly by Mr. *Elton*'s Quadrant than by *Davis*'s; as in this laſt mentioned Inſtance the Latitude appears to be 35° 39′ N. by *Davis*'s, when Mr. *Elton*'s makes it 36° N. There is a Note added by Capt. *Hoxton* at the End of this Journal; *viz. That the Difference at different Times between* Davis's *and* Elton's *Quadrants is occaſioned by ſhifting the Shade-Vane of* Davis's.

To this Journal were annexed ſome "Obſervations "of the Latitude by the fixed Stars in the foreſaid "Voyage by Mr. *Elton*'s Quadrant, without uſing "the Horizon."

Theſe Obſervations are generally taken from two Stars, and the Latitude calculated from each Obſervation; and ſo they are found to agree commonly within 4′ or 5′. The greateſt Difference aroſe once to 13′. When by an Obſervation taken by * *Syrius*, the Latitude was found to be

	42° 46′ N.	by * *Procyon*	42° 56′ N.
Courſe inter Obſ. SSW.		Where the Difference is	13′ N.
S 3′ ½	0° 3′		
	42° 43′		

Capt.

Capt. *Hoxton*, when at Anchor in *Cheſea-Peak* Bay, found the Latitude 37° 29′ N. Off *Cedar Point* in *Potuxon* River 38° 7′ N. Off Cape *Henry* 37° 6′ N. And in a Letter to Mr. *Elton* he declares, "That he obſerved with his Quadrant both "by the Sun and Stars, in all the various Sorts of "Weather he met with in his late Voyage to and "from *Maryland*, without regarding the Horizon, "with as great Exactneſs, as with *Davis*'s Quadrant "when the Sun and Horizon were clear."

There was likewiſe put into the Hands of the Publiſher, another Letter from one Mr. *John Walton* to Mr. *Elton*, containing ſome Obſervations of the Latitude in *Leghorn* Road, and ſeveral of the Ports of *Spain*, which were found, after repeated Experiments, exactly to agree with the known Latitudes of thoſe Places: Mr. *Walton* adds, That he made ſeveral Obſervations in his Paſſage Home, in hard Gales, and a great Sea, and when it was ſo hazy, that the common Quadrant was of no uſe, for want of an Horizon.

III. *A remarkable Caſe of a Gentlewoman who died of a* Hydrops Ovarii, *in the Thirty-third Year of her Age, after having been tapped Fifty-ſeven times. By Mr.* John Belchier, *Surgeon.*

IN the Year 1725, the Wife of Mr. *Newberry*, a Merchant in this City, complained of a Pain in her Left-Side, near her Groin, internally, which ſen-